Emergency Nutrition Assessment of Crisis Affected Populations Darfur Region, Sudan

August-September 2004

A survey jointly conducted by:

U.S. Centers for Disease Control and Prevention (CDC)
and
United Nations World Food Programme (WFP)

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ACKNOWLEDGEMENTS

The survey was jointly designed and implemented by the Centers for Disease Control and Prevention (CDC) and the United Nations World Food Programme (WFP), and many other organizations contributed time and effort to the survey: UNICEF, and Save the Children (U.S. and UK) with support from the Ministry of Health of Sudan. We would like to acknowledge the survey teams and their efforts that went into completing the survey under difficult circumstances.

The survey was jointly funded by the Office of Foreign Disaster Assistance and WFP.

EXECUTIVE SUMMARY

A cluster survey was conducted in all three states of the Darfur region of Sudan in order to assess the nutritional and micronutrient status of children 6 to 59 months of age, micronutrient status of their mothers, crude and age-specific mortality, and the coverage of nutrition, food and health interventions for resident and internally displaced persons (IDP), both in camps and integrated with the host community, included within the UN humanitarian profile of crisis affected populations. Data, from 46 clusters of 20 households, were collected between September 2 and September 20, 2004 on 880 households which included 888 children 6 to 59 months of age.

The nutritional situation in Darfur is precarious. The prevalence of global acute malnutrition (GAM) was 21.8% (95% confidence interval (CI): 18.2, 25.3), above the 15% cutoff commonly used to define a serious situation. The prevalence of severe acute malnutrition (SAM) is also elevated at 3.9% (95% CI: 2.3-5.6). Of those children with SAM, eight had edema. Micronutrient deficiencies were also common. The prevalence of anemia among children 6 to 59 months of age was 55.3% and anemia among non-pregnant mothers was 28.0%. Iodine deficiency, as assessed by goiter, among mothers was also elevated at 23.6% (95% CI: 15.6, 31.5) and poses a significant threat to health and development in Darfur.

Supplementary feeding coverage is low with only 18% of children identified as moderately malnourished enrolled at the time of the survey. No children identified as severely malnourished were enrolled in therapeutic feeding.

A measles vaccination campaign was recently completed in Darfur among children 9 months to 15 years of age. Survey results showed that measles vaccination coverage among children 9-59 months old was 66.7%, (95% CI: 56.8, 77.6). Vitamin A coverage was 74.2% (95% CI: 66.8, 81.5) during the same period for the same age group.

More than half of all households (574 (65.9%)— including both resident and IDP— reported having a ration card at the time of the survey. However, 22% of IDP households did not have a ration card. Receipt of general ration distributions increased between April and August. In April, 21.4% of households with a ration card received a general distribution, this increased to 69.7% in August.

Households self-reported receiving sorghum, wheat, pulses corn-soya blend (CSB) and oil at their last distribution-. Of those households with a ration card that received a ration in September (169 households), more than half did not receive oil or pulses (64.5% and 72.8% respectively). Cereal distribution was higher with 75% of the households receiving wheat and 52.1% receiving sorghum. More than half of households (57%) only received a cereal in the general ration in September.

The crude mortality rate (CMR) for February through August 2004 was 0.72 (95% CI 0.44-0.99) and the under five mortality rate (U5MR) was 1.03 (95% CI: 0.38, 1.68) which are below the emergency benchmarks of 1 per 10,000 per day for CMR and 2 per 10,000 per day for U5MR. However, the design effect for mortality was high (2.93) suggesting deaths are clustered. The CMR for males differed significantly from the CMR for females. Mortality rates were higher among those displaced compared with residents and higher among IDPs living in camps and spontaneous

settlements than those living with the host community and crisis affected residents. However, these differences were not statistically significant.

These data represent average mortality across a population of close to 1.6 million persons, including both resident and IDPs. Deaths that occurred in areas that were insecure at the time of the survey will have been missed as will deaths that occurred before the beginning of the recall period (February 10, 2004). This survey is not comparable with surveys conducted among different population sub-groups or different geographic areas.

Mortality rates reported in this survey do not predict future mortality. With high levels of malnutrition, substantial mortality is expected in the coming months if conditions do not improve. This survey suggests that there is a window of opportunity during which effective interventions— implemented immediately— may prevent future mortality.

This is the first survey to give one overall estimate for acute malnutrition among the crisis affected population in Darfur since the crisis began 18 months ago. It is also the first Darfur-wide survey to estimate the prevalence of micronutrient deficiencies. The United Nations identified an estimated 1.6 million persons as crisis-affected, as of August 2004. Results from this survey suggest that the nutritional status among those persons is alarming and that coverage of nutrition and essential public health programs is poor.

Insecurity continues to hamper humanitarian interventions. Delivering a full general ration to beneficiaries should be made a priority to address malnutrition and micronutrient deficiencies. This alone, however is not sufficient to reduce the prevalence of malnutrition. Measles coverage needs to be increased, especially where crowded conditions exist. A basic minimum package of public health interventions needs to accompany food and nutrition activities. Health and nutrition activities cannot exist in isolation. They must be integrated to best serve the population in need. It should be recognized that there are limitations in the ability to cover and reach all areas of Darfur. However, in those areas that are being reached, especially camps and spontaneous settlements where conditions are extremely crowded, programs must be improved to meet minimum standards.

Humanitarian relief agencies in Darfur are operating under difficult circumstances. It is a challenging environment in which to provide large-scale relief efforts. Staff, both national and international, continue to be exposed to security risks while carrying out programs and delivering services. Additionally, the poor infrastructure continues to hamper delivery of commodities in many areas. The observations and recommendations contained within this report must be considered in the broader context of security and logistical feasibility.

Recommendations

General Ration

- Increase the distributed general ration to meet the 2100 kcal minimum requirement
- Provide a full general ration, consisting of a cereal, pulse, CSB, fortified oil and salt
- If commodities are not available for the current distribution, compensation for missing commodities per World Food Programme (WFP) guidelines must be provided
- When planning a general ration, account for losses due to milling

Selective Feeding

- Blanket supplementary feeding should be implemented on the ground for all children 6 to 59 months of age and pregnant and lactating women
- Targeted supplementary feeding should continue as a blanket supplementary feeding program is established. However, these programs need to expand to properly identify and treat moderately malnourished children
- Ensure that appropriate commodities—CSB, oil and sugar— be provided for supplementary feeding
- WFP and UNICEF, in conjunction with implementing partners should undertake a review of protocols and programs for supplementary and therapeutic feeding
- Key indicators of selective feeding programs should be reported regularly, collected, and analyzed on an ongoing basis

Micronutrient deficiencies

- Discuss with other partners the use of iodized oil capsules for the treatment of iodine deficiency among women and children
- Increase the amount of iodized salt provided in the ration from 5 to 10 grams, and ensure that it is distributed in small packets and by scoops

Measles

- Initiate an immediate measles mop-up campaign targeting children missed by the previous campaign as soon as possible. Consider adding a measles component to the upcoming National Immunization Days for polio
- Increase efforts to reach previously inaccessible areas for the measles campaign.
- Make immediate mop-up campaigns for measles a priority in camps and set up a system in each camp for vaccinating new arrivals
- Lower the lower-age limit for measles vaccination to 6 months from 9 months

Overall health recommendations

- Improve coverage of latrines
- Improve access to water in quantity and quality, particularly in camp settings
- Hygiene education campaigns and other feasible public health activities should be implemented during distributions, general ration and supplementary feeding
- Increase the uses of insecticide-treated nets, accompanied by a strong educational campaign on their proper use
- Increase access to basic primary health care services by supporting existing clinics or mobile outreach

INTRODUCTION

Most of the Darfur region's estimated 6 million residents are sedentary African tribes—predominantly Fur, Zaghawan and Masaalit—with a smaller minority of pastoralist Arab populations. The geographically isolated region has long been plagued by poverty, recurring droughts, chronic food insecurity, and poor infrastructure and social services. Conflict between sedentary and pastoralist groups began in the early 1980s as desertification, and population pressures increased competition for arable land at the same time that law and order began a slow decline.

Prolonged neglect of the Darfur region led to an increasing sense of marginalization in the area and subsequent armed uprising that began in April 2003. Militia attacks on civilian populations believed to be sympathetic to, or supporting, the two main rebel groups—the Sudanese Liberation Movement/Army (SLM/A) and the Justice and Equality Movement (JEM)— were widespread. The conflict intensified in late 2003 and early 2004 resulting in large-scale burnings of villages and crops, destruction of water sources, looting of livestock, and massive population displacement.

In April 2004 the SLM/A and JEM signed a ceasefire agreement with the government of Sudan (GOS) but violence, attacks on civilians, and population displacement continues. At the time of the study an estimated 1.45 million people had been displaced within Darfur, and another 200,000 refugees have fled to Chad. In all 2 -2.5 million people are believed to be affected by the crisis, described by the United Nations (UN) as the worst humanitarian emergency in the world today. Substantial increases have been made in humanitarian access since June but insecurity, poor infrastructure and insufficient capacity continue to hamper humanitarian efforts.

Beginning in the spring of 2004, non-governmental organizations conducted a number of nutrition surveys in selected internally displaced persons (IDP) camps using the Sudanese Ministry of Health guidelines[1] which mirror internationally accepted methodologies. These surveys reported global acute malnutrition (GAM) rates ranging from 12.6 % to 39.0% (< -2 SD) and severe acute malnutrition rates ranging from .8 % to 9.6% (< -3 SD)[2]. These rates indicate that an emergency situation exists in many parts of Darfur, but to date no large scale survey of the affected Darfur population has been conducted. Furthermore, there is little understanding of the nutritional situation among the residents and internally displaced persons (IDP) integrated into towns and villages. In order for the international humanitarian community to plan an appropriate food, health and nutritional response to the emergency, additional information about the status of the population is needed.

GOALS AND OBJECTIVES

The overall goal of this survey is to assess the health and nutritional status of children 6 to 59 months of age and their mothers among resident and IDPs identified in the UN humanitarian profile of crisis affected populations. This assessment will be used to establish baseline data and to provide recommendations to WFP and national and international organizations providing health and nutrition services.

The specific objectives of this survey are to estimate the following:

- The prevalence of acute malnutrition in children 6 to 59 months of age, based upon weight-for-height z-scores and edema
- The prevalence of malnutrition in pregnant women, based upon mid-upper arm circumference
- The prevalence of clinically apparent vitamin deficiencies (riboflavin and vitamins A and C) in children 6 to 59 months of age
- The prevalence of clinically apparent vitamin deficiencies (riboflavin, iodine, and vitamin C) in mothers of children 6 to 59 months of age
- The prevalence of anemia, based upon hemoglobin concentration, in children 6 to 59 months of age and their mothers
- The 2-week cumulative prevalence of diarrhea and acute respiratory infection in children 6 to 59 months of age
- The coverage of recent measles vaccination campaigns among children 9 months to 5 years of age
- The coverage of vitamin A supplementation among children 6 months to 5 years of age
- The coverage of supplementary and therapeutic feeding programs for malnourished children less than five years of age
- The coverage of the general ration distribution, in terms of frequency and content
- Crude mortality rate and causes of death
- Age-specific mortality rates, including the mortality rate among less than five years of age

METHODS

Due to logistical, time and security constraints, it was only possible to conduct one survey covering an area that was inclusive of all three Darfur states. The same constraints also limited the total number of households that could be surveyed within the survey period.

I. Sample Size

Sample size calculations used the following assumptions: 1) the limit of statistical significance (alpha) is 0.05 (that is, 95% confidence interval will be used), and 2) the power (beta) equals 0.8. Estimates of demographic data used to formulate assumptions for sample size calculations came from a Centers for Disease Control and Prevention (CDC)-assisted survey carried out by the United Nations High Commissioner for Refugees and WFP among refugees from Darfur settled in northern Chad[3]. We assumed an average of 1.35 children aged 6–59 months of age, a family size of six, and one mother per household. Prevalence estimates were based on previous non-governmental organization (NGO) surveys carried out in Darfur, the survey carried out in Chad, United Nations Children's Fund (UNICEF) State of the Worlds Children 2004 report and the Mixed Indicator Cluster Survey (MICS) carried out by UNICEF in Sudan in 2000.[4,5] However, because the sample size required to achieve a given statistical precision increases as the estimated prevalence approaches 50%, prevalence rates for this survey were assumed to be closer to 50% than those found in other surveys, to avoid having a final sample size that was too small. For some indicators (for example anemia and malnutrition in pregnant women) the required sample size was unfeasibly large for logistical reasons. We accepted that the survey would not be able to measure these indicators with any useful precision.

Because sampling involved using cluster survey methodology, it was necessary to increase the sample size by a factor which would allow for the design effect. The design effect is the ratio of the variance of the estimate obtained using cluster survey methodology to the variance that would be obtained if a simple random sample were taken of the same sample size. Design effects were estimated using previous CDC surveys carried out in similar emergency situations, as well as published design effects from demographic health surveys. The desired precision was based on the estimated prevalence and cut-offs for programmatic action.

Assumptions and estimated sample size for selected nutrition and vaccination outcomes, Darfur Nutritional Assessment, August–September 2004.

Target group and indicator	Estimated prevalence[+]	Design effect[±]	Desired Precision[‡]	Sample size[§]	Households
Children 6–59 months					
Acute malnutrition (< -2 SD)	35%	2	±5%	698	517
Anemia (<11.0 g/dL)	50%	1.5	±5%	576	427
Vitamin A deficiency	20%	1.5	±5%	369	273
Measles vaccination coverage	50%	2.0	±5%	768	569
Pregnant women[*]					
Malnutrition (MUAC < 21.0)	20%	2	±10%	122	1,016
Anemia (<11.0 g/dL)	50%	1.5	±10%	144	1,200
Mothers of children <5 yrs					
Anemia (<12.0 g/dL)	50%	1.5	±5%	576	384

[+]From previous surveys and erring towards 50%
± Design effect of >1.5 chosen as malnutrition due to displacement may be clustered
[‡]Without adjusting for missing and refusals
[§]Assuming 1.35 children aged 6–59 months, 1.5 children aged 0–59 months and proportion of pregnant women of 2%
*Owing to the large sample size required, the survey was not anticipated to be able to measure anemia and malnutrition in pregnant women with any useful precision

The primary objectives of this survey were to measure the nutritional status of young children, their micronutrient status and that of their mothers, and to examine the coverage of essential nutrition and health programs. However, an additional objective of the survey was to estimate the crude mortality rate (CMR) with as much precision as a logistically feasible sample size for the nutrition survey would allow. Based on a CMR of 1.0 per 10,000 per day, a 95% CI of 0.5 and a design effect of 2, and rates calculated for 2-month increments, a total of 854 households would be required (see below).

We considered a CMR of 1 per 10,000 per day to be a conservative estimate. Previous surveys in conducted in Darfur reported mortality rates between 1 and 4 deaths per 10,000 per day.[2] The

benchmark for an emergency is >1 deaths per 10,000 per day.[6] For the CMR a design effect of 2 was used. This is could be considered an underestimate, as conflict-related mortality might be highly clustered. The same design effect was assumed for under-5 mortality. Deaths in this age group are more likely to be infectious disease-related and therefore less likely to be clustered. The figure of 854 households required is before adjusting for refusals and non-response. The number of households required assumes a household size of six persons. As mentioned above, sample size was driven by the nutrition objectives of the survey rather than mortality.

Sample Size Projections for a Cluster Survey of Mortality in Darfur, Looking at Crude Mortality Rates in 2-Month Increments

Mortality indicator	Estimated rate	Design effect	95% CI	Sample size	Households
Crude Mortality Rate	1/10,000 per day	2	±0.5	5,122	854
Under-5 Mortality Rate	4/10,000 per day	2	±2	1,281	854

In most circumstances, little additional benefit is gained from increasing the number of clusters above 30. However, in the case of the crisis affected population in Darfur, reports suggested that conditions varied from state to state and might also differ according to whether the affected population was displaced or non-displaced, or if displaced whether living within camps or among the general population. To allow for potentially significant variability in outcomes of interest within the population of interest, the number of clusters targeted was increased to 45 with 20 households to be selected in each cluster.

Selection of the Primary Sampling Unit (clusters)

Primary sampling units were drawn from a list of 1,655,988 persons in 140 locations in all three Darfur states identified as crisis affected by the UN as of August 2004. The list was augmented by additional data from NGOs in Khartoum. The list was comprised of IDPs in camps (official and spontaneous), IDPs living amongst the resident population, and residents considered crisis-affected (defined as a location where the IDP population was equal to or greater than that of the host community). This list is also used by WFP to target locations for food distribution (Annex I).

At the time the sample was drawn, some areas of Darfur were inaccessible, mainly due to insecurity, but also because of seasonal rains. However, as both the security situation and logistical access to locations were extremely fluid, we decided to not exclude any locations from the sampling frame for these reasons. To compensate we began with 55 clusters, rather than the required 45, on the assumption that as many as 10 clusters would be inaccessible for the duration of the survey period. Clusters were chosen population-proportionate to size using C-sample (Epi Info™ version 6.04.B) (Annex II).[7] Population data were updated at the field level in each state at the time of the survey.

Second and Subsequent Stages of Sampling (Cluster Location Within the Chosen Community)

At the state capital level, data on the affected population from UN agencies and NGOs were reviewed. At the local level, community leaders were asked for population information following reassurances that these data would not be linked to food or non-food item allocation purposes. NGOs delivering services at the local level were also involved in population estimation and mapping.

To determine the actual location of clusters within selected locations, we used population-proportionate to size sampling methodology. Our goal was to reach a population level of 100-200 households from which to choose the final 20. In towns and large camps, several stages of sampling were required. We used three main methods to achieve population proportionate to size sampling, depending on the situation.

(1) In planned camps, maps that divided the population into sectors of known population size were often available from the NGOs providing camp services. In these cases a cumulative population list by sector was compiled and a random number table used to select the cluster location. If each sector was of equal size, one sector was chosen using a random number table.
(2) In spontaneous or unplanned camps, existing maps with population data were rarely available. However, all households reportedly belonged to individual Sheiks, and no household belonged to more than one Sheik. Furthermore, in unplanned camps, IDPs belonging to the same Sheik were reported to live together for the most part. In these cases a cumulative list of household numbers by Sheik was compiled and a random number table used to select the cluster location.
(3) In large towns, villages and locations with a mixture of IDPs in and outside camps, and resident populations, the Sheik household listing method was used whenever possible. In most cases, however, that method could not be used. In these cases community leaders, NGOs and others participated in mapping the community and compiling cumulative population lists by section. A random number table was then used to select the cluster location. In a few cases, only the proportion of the population living in each section was known and this was used to select the cluster location.

Selection of the Basic Sampling Unit (Household)

A household was defined as those sleeping in the same structure and eating out of the same pot. Members of a household were not necessarily relatives by blood or marriage. If several separate families were living in the same compound, they were regarded as separate households. If a polygamous family lived and ate together, they were considered one household. Once the cluster location was identified, the team leader walked the boundary of the cluster with a community leader. The total number of households was divided by 20 to provide a sampling interval, which was usually between 5 and 20 depending on the size of the cluster location. The team leader then identified each selected household and after getting initial consent from a household member, marked the household with tape or with a number marked in the dirt or marked by rocks.

All chosen households were selected, whether or not they contained a child 6–59 months of age. If household members were not present, community members were asked to bring them to the house. Households were visited at least three times in an effort to identify household members, unless security

or logistic constraints prohibited the amount of time spent in a cluster. Basic demographic information was taken from an adult household member (usually brother or sister of the head of household), if available. If the members had departed permanently or were not expected to return before the survey team had to leave the village, the household was skipped and not replaced. Where possible, survey teams visited the cluster location on two successive days or (security permitting) slept close to the cluster location.

II. Training and Data Collection

Training and data collection were conducted separately in each of the three states. Each state team shared issues arising from training and sampling daily by satellite telephone. State teams were comprised of at least one international WFP nutritionist and one CDC epidemiologist who were present throughout the data collection period. Other UN agencies, particularly UNICEF, also participated in the survey and NGOs provided staff members where possible. Team composition varied by state, due to logistical differences and access constraints. All survey workers received 2 days of classroom training and 1 day of field practice training under close supervision. Team members were trained jointly on the rationale for the survey, sampling, consent, and questionnaire administration and referral. Separate training was then conducted for team members involved in questionnaire administration, anthropometric measurements, and laboratory testing.

Questionnaire

WFP and CDC collaborated in the creation of a data collection form. The entire form was translated from English into Arabic, a major language in Darfur Region, and then back-translated into English by a second translator (see Annex III for the English form). The survey instrument was pre-tested in communities in South and West Darfur, which were not included in the survey sample and revisions made accordingly.

Following consent, interviewers asked a series of household questions about the marital status of the head of the household and displacement. Additional questions on ration cards and the receipt of rations over the previous 6 months, as well as the commodities received during the last distribution were asked. Household respondents were also asked to answer a 7-day dietary recall section. Questions on access to latrines, type of household shelter, and bed net use were included in the survey.

Mortality was assessed using the retrospective household census method. Respondents were asked to list all members living in the household at the time of the previous Eid Al Adha. This important religious event occurred around February 10, 2004 in the Gregorian calendar. This event was chosen as it was well-know to the population, even in isolated rural areas. First, all household members living in the household at that time were listed by age and sex, with the head of the household being listed first. The respondent was then asked where each person was at the time of interview. Possible choices were: alive and living in the household, alive, living elsewhere, missing, and dead. Births and deaths occurring in each household between this time and the date of the survey were recorded along with month of occurrence. A local calendar of events was used to determine ages of household members and dates of death. Cause of death was assessed using a verbal autopsy adapted from the World Health Organization (WHO) (see Annex IV.)

Survey workers asked questions of each mother with a child 6 to 59 months of age in the household regarding breastfeeding practice, pregnancy, mother's enrollment in supplementary feeding, night-blindness during the most recent pregnancy and illness in the two weeks prior to the survey.

Information was also gathered on each child 6 to 59 months of age from an adult household member (preferably the mother). Questions were asked regarding enrollment in selective feeding programs (therapeutic and supplementary), vitamin A supplementation and measles vaccination and recent illness. Vaccination records were reviewed where available. However, mothers' reports were also taken as evidence of vaccination against measles and receipt of vitamin A supplementation.

Anthropometric and Biochemical Assessments

Survey workers measured children's weight, height/length, and assessed the presence of edema. Children were weighed to the nearest 100 grams with a UNICEF Uniscale. For children less than 85 centimeters (cm) or younger than 2 years of age, length was measured to the nearest millimeter in the recumbent position using a standard height board. Children 85 to 110 cm were measured in a standing position. Edema was assessed by applying thumb pressure to the feet for approximately 3 seconds and then examining for the presence of a shallow print or pit. MUAC was measured on pregnant women using a MUAC measuring tape. Where facilities existed malnourished children and women were referred therapeutic feeding centers for treatment of severe malnutrition (<70% weight-for-height percent of median or MUAC <18.5 cm for pregnant women) or to supplementary feeding programs for treatment of moderate malnutrition (≥70% to <80% weight-for-age percent of median or MUAC <21.0 cm for pregnant women).

In every other household with children 6–59 months of age, consenting survey subjects underwent a fingerstick blood sample obtained by piercing the skin of the fingertip with a safety lancet. The first drop of blood was wiped away with dry gauze. A cuvette of the Hemocue hemoglobinometer (anemia indicator) was filled with a second drop of blood. Two to three drops of blood were spotted onto Schleicher and Schuell Grade 903 paper and dried for return to the laboratory in the United States for dried blood spot retinol (vitamin A indicator).

The Hemocue method of measuring hemoglobin concentration is accurate and easy to use in the field.[8-11] Results can be obtained within 30 seconds of obtaining the blood specimen. Each filter paper

containing blood spots was dried on site and stored in a plastic bag containing desiccant and a humidity indicator card. Upon arrival in the United States, they were stored at –70º C and will continue to be stored in this manner until elution and testing using an available high pressure liquid chromatography (HPLC) assay for retinol. The International Vitamin A Consultative Group (IVACG) recommends serum retinol as the biochemical indicator to assess vitamin A deficiency.[12] Studies from other labs have shown dried blood spot retinol to be comparable to serum retinol.[13,14] Where services were available, individuals found to be anemic were referred to clinics for supplementation.

The data collection form and the filter paper specimens from each survey participant were identified only by survey identification number. The data collection form contained no identifying information. The laboratory results, when available, will be merged with the questionnaire data using the survey identification number.

III. Consent

All household members received a verbal explanation of the survey for both the household questionnaire, including anthropometry, and for the clinical and biochemical assessments for micronutrients. At the beginning of each questionnaire was a paragraph requesting consent from the interviewee. The consent or refusal was recorded on the form by the interviewer. Households were informed that the survey was confidential and that their answers would not affect food distributions. Participation was voluntary and household members had the right to refuse to answer any or all questions, as well as anthropometric and biochemical assessments. Household and mother/child consent was recorded on each questionnaire.

IV. Definitions

Z-scores were used in most analyses of anthropometric data on children in this survey. However, percent of median is used in many situations where a simpler calculation is needed, such as screening for admission to feeding programs. Therefore, for purposes of comparing the results of this survey to other data, the prevalence rate of acute malnutrition is also presented as percent of median. The relevant definitions are as follows:

Type of malnutrition	Anthropometric index	Degree of malnutrition	Definition using z-score	Definition using percent of median
Acute	Weight-for-height	None	$\geq$ -2.0	$\geq$ 80%
		Moderate	$\geq$ -3.0 but < -2.0	$\geq$ 70% but < 80%
		Severe	< -3.0 or edema	< 70% or edema
Global Acute (GAM)	Weight-for-height	Moderate + Severe	<-2.0 or edema	<80% or edema
Severe Acute	Weight-for-height	Severe	<-3.0 or edema	<70% or edema

(SAM)

Z-scores and percent of median were derived from comparison of children in the survey sample to the NCHS/CDC/WHO reference population.

MUAC for pregnant women: Body mass index (BMI) cannot be used to assess the nutritional status of pregnant women because of weight gain during pregnancy, so MUAC has been recommended as the assessment tool. The recommended cut-offs for MUAC in pregnant women are shown below (MSF unpublished revised nutrition guidelines).

Category of malnutrition	MUAC
Global undernutrition	< 21.0 cm
Moderate undernutrition	18.5–21.0 cm
Severe undernutrition	< 18.5 cm

Anemia: The cut-off points for hemoglobin concentration used to define anemia depend on the age and sex of the person tested, as shown below.[15] All consenting mothers and children 6 to 59 months of age were assessed for anemia.

Age or sex group	Hemoglobin concentration (g/dL) defining anemia
Children 6 – 59 months	< 11.0
Non-pregnant and women >13 years	< 12.0
Pregnant women > 13 years	< 11.0

Vitamin A: The cut-off point for vitamin A deficiency as defined by dried blood spot retinol is <20ug/dL (0.70 µmol/L). [12]

Additionally, the children 6–59 months of age were examined for the presence of Bitot's spots and their mothers were questioned about the presence of night blindness. Vitamin A deficiency is considered to be a significant public health problem in a population if:

- ≥5% of the women experienced night blindness during thier last live-birth pregnancy in the last 3 years[12]

Vitamin B2: Ariboflavinosis develops when there is insufficient B2 in the diet. Clinical signs include: cheilosis (shiny and dry cracked lips) and angular stomatitis (fissures at the corner of the mouth, including healed, scarring from previous fissures).[16] Mothers and children aged 6 to 59 months of age were assessed for clinical signs of riboflavin deficiency (ariboflavinosis).

Vitamin C: Mothers were assessed for the presence of bleeding gums (inter-dental papillae) and children 6–59 months of age were assessed for bleeding gums (inter-dental papillae / teeth eruption) as clinical signs of vitamin C deficiency.[17]

Goiter: Mothers were assessed for the presence of visible goiter (grade 2) as an indication of iodine deficiency disorder.[18]

V. Data Analysis

Data were entered into Epi Info™ version 6.04d software.[7] The calculation and analysis of anthropometric indices was conducted in EpiNut, a module within Epi Info™. Analysis of all other variables from the clinic-based survey was carried out in SUDAAN version 8.0.2.[19] Indicators of the precision of prevalence estimates, such as confidence intervals, for major health outcomes accounted for the cluster sampling used in selecting the sample for this survey. A p-value <0.05 was considered to be statistically significant. To account for clustering and differing sample weights, SAS-callable SUDAAN 8.0.2 was used to compute the 95% confidence.[19] A sample weight was associated with each record to account for the probability of selection and a post-stratification adjustment based on the population size of each camp/village.

RESULTS

I. Description of Survey Sample

Households

The survey sample included 880 households. Of the total number of households 282 were in North Darfur, 342 in the West Darfur and 256 in the South Darfur. Only one cluster of 20 households was sampled in SLA/M controlled areas. More than half of households (64.7% 95% confidence interval (CI): 54.9, 73.9) were displaced at the time of the survey (see table 1), with the majority being in West Darfur. Mean time of displacement was 7.5 months (1–60 months). Among all households, 39.7% (95% CI: 30.8, 49.4) reported no access to a latrine; 45.0% (95% CI: 33.4, 57.2) of IDPs did not have access to latrines. Overall, traditional housing and plastic sheeting were the most common shelters, 63.2% and 34.1%, respectively. Among the IDPs, 52.5% lived under plastic sheeting, 43.5% were residing in traditional housing, and 2.1% had no shelter.

Individuals

Overall, the survey collected information on 5470 members in selected households. These included 2677 (48.7) males, 2711 (49.6) females and 82 for whom no gender was recorded. The survey collected more detailed data on 888 children 6 to 59 months of age. Among these children, 457 (51.6%) were boys, 429 (48.4%) were girls, and two did not have gender recorded. The survey sample also included 603 mothers of children 6–59 months of age. Accurate age in children was extremely difficult to assess, even with the use of the local calendar, therefore the data is not presented by age breakdown.

II. Child Nutrition

Acute Malnutrition

Anthropometric measurements were available for 842 children. The prevalence of global acute malnutrition is 21.8% (95% CI: 18.2, 25.3); severe acute malnutrition is 3.9% (95% CI: 2.3, 5.6), (Table 2). Of those children with severe acute malnutrition, 8 (24%) had edema. Among children without edema, the mean weight-for-height z-score is – 1.23 and the standard deviation is 0.97. For children 6–59 months of age, the prevalence of acute malnutrition is not statistically higher among the 101 boys (23.2% with acute malnutrition) than among the 69 girls (17.0% with acute malnutrition).

Figure 1 shows the distribution of weight-for-height z-scores. The entire curve for the survey sample is slightly shifted to the left when compared to that of the reference population.

Percent of Median

Table 3 shows the prevalence rates of acute malnutrition expressed in percent of median.

Selective Feeding Coverage. Supplementary and therapeutic feeding programs have been established in Darfur on a limited basis. Relatively few children (18%) who were eligible for supplementary feeding were enrolled. (Enrollment criteria are based upon weight-for-height percent of median; supplementary feeding= $\geq$70 % to <80%, and therapeutic feeding= < 70% + edema). No children identified as severely malnourished were enrolled in therapeutic feeding.

Micronutrient Deficiencies

Anemia. The prevalence of anemia was elevated with 55.3% (95% CI: 50.4, 60.2) of assessed children falling below the cut-off of <11 g/dL and 1.3 % of children were found to have severe anemia (<7.0 g/dL) (see Table 4). The mean hemoglobin concentration of children was 10.7 g/dL (range: 4.3- 15.9). Figure 2 shows the distribution of hemoglobin concentration.

Riboflavin and vitamin C. Children were assessed for signs of riboflavin and vitamin C deficiency. Due to a lack of clinically trained nurses and differences in assessment methods, the results are not reported, although limited cases of angular stomatitis and/or bleeding gums were noted.

Vitamin A. Children were examined for the presence of Bitot's spots, but none were identified among the children included in the survey. Dried blood spot cards for the assessment of serum retinol concentration were prepared on 511 children 6 to 59 months of age. Specimens were delivered to Craft Technologies Institute in the United States for analysis. Results are expected in November 2004.

III. Child Health and Vaccination

Childhood Morbidity

Mothers or caretakers reported that 74.9% (95% CI: 68.9, 80.94) of children 6-59 months of age had been sick in the previous 2 weeks (see Table 5). Diarrheal disease was the most frequently reported illness (41.0%, 95% CI: 33.8, 48.3), followed by fever (30.7%, 95% CI: 25.2, 36.2), acute respiratory

infection (18.0%, 95% CI: 14.5, 21.6), and malaria (6.5%, 95% CI: 3.9, 9.0). Measles were reported in 2.1% of children.

Among children who were either moderately or severely malnourished, 84.8% (95%CI: 76.8, 92.7) were sick in the 2 weeks before the survey, where as 72.8% (95% CI: 66.8, 78.8) of non-malnourished children reported illness during the same period. This difference was statistically significant p =0.006. There was also a statistically significant difference among malnourished and non-malnourished children reported diarrhea during the same recall period, 55.2% (95% CI: 41.6, 68.8) and 37.7% (95% CI: 31.5, 43.9), p= 0.013. Almost all severely malnourished children (97.2%) reported illness in the 2 weeks before the survey. When compared to non-malnourished children, 74.5%, there is a statistical difference, p= 0.002.

Vaccination

Measles. The mothers of 555 (66.7%, 95% CI: 56.8, 77.6) children aged 9–59 months reported that their child had received measles vaccination in the previous 6 months. This figure includes children with cards and those with verbal history (see Table 6). Cards were not provided during the most recent mass vaccination campaign. The mass campaign targeted children 9 months to 15 years of age. When younger children (6–59 months) are included, the coverage slightly decreases to 65.1% (95 % CI: 55.7, 74.6).

Vitamin A supplementation. Among children 9–59 months of age, 74.2% (95% CI: 66.8, 81.5) had received a vitamin A supplement since Wahid (February) (see Table 6). When younger children are included, the coverage remains the same, with 74.1% (95% CI: 67.2, 81.0) of all children receiving vitamin A since Wahid. Vitamin A supplementation is provided outside of the measles vaccination campaign.

IV. Mothers

Overall, 86 (14.8% (95% CI: 12.3, 17.4)) mothers of children 6–59 months of age were pregnant at the time of the survey (Table 7). Almost half of mothers (50.68% (95% CI: 46.4. 54.9)) were breastfeeding a child. Illness during the prior 2 weeks was reported by 73.6% (401/551) of mothers; 39.5% of mothers reported fever. Supplementary feeding enrollment was uncommon among women. Only 5.6% of mothers were currently in supplementary feeding; five (17.8%) were pregnant and 16 (57.1%) were lactating.

MUAC. MUAC was measured on 78 pregnant women who also had a child 6 to 59 months of age. Only one woman had a MUAC < 21.0 cm.

Micronutrient deficiencies. Among mothers of children 6 to 59 months of age who were assessed for micronutrient deficiencies, 116 (23.6% (95% CI: 16.7, 31.5)) had detectable goiter, indicating substantial iodine deficiency and a risk of having iodine-deficient children at birth. Additionally, 93 (15.5% (95% CI: 9.1, 21.8) women reported night-blindness during their last pregnancy, a symptom of vitamin A deficiency (Table 8).

Anemia, assessed by hemoglobin, was common among women. In non-pregnant mothers, 26.2% (95% CI: 20.6, 31.8) were anemic and 1.1% had severe anemia. For pregnant mothers, 22.2% (95% CI: 12.3,

32.2) were classified as anemic. There were no cases of severe anemia identified among pregnant women. The mean hemoglobin concentrations were 12.8 g/dL and 12.4 g/dL for non-pregnant and pregnant mothers, respectively.

V. General Food Ration

Ration cards. Ration card ownership was reported by both resident and IDP populations. Overall, 574 (65.9%) households had a ration card at the time of the household interview (Table 9). More displaced households, 414 (77.5%), than resident households, 156 (47.3%), reported having a ration card; 22% of displaced households did not have a ration card.

General ration. Receipt of general ration distributions increased between April and August. Because the survey was conducted in September, not all populations may have received their distribution at the point of the household interview. In April, 21.4% of households with a ration card received a general distribution. This increased to 69.7% in August. However, 30.3% of registered ration card households still did not receive a ration in August.

Households self-reported receiving the following commodities at their last distribution- sorghum, wheat, pulses corn-soya blend (CSB) and oil. Of those households with a ration card that received a ration in September (169 households), more than half of households did not receive oil or pulses, 64.5% and 72.8%, respectively. The distribution of cereal was higher with 75% of the households receiving wheat and 52.1% receiving sorghum. More than half of households (57%) only received a cereal in the general ration in September.

VI. Mortality

A total of 5,339 persons were reported to have been living in survey households on February 10, 2004. The recall period between this date and the data of the survey was 215 days. Of these, 4,932 (91.9%) were reported to be alive and still living in the household, 313 (6.3%) were reported to be alive and living elsewhere, 81 (1.5%) were reported to have died since that time, and 13 (0.2%) were reported missing or their status was not recorded. In the results that follow, missing persons are not classified as dead.

The point estimate for the crude mortality rate during this period is 0.72 (95% CI 0.45-0.99) which is not above the emergency threshold (see Table 9). The under-five mortality rate for the 7-month recall period is below the emergency benchmark of 2/10,000/day.That is only slightly higher than the crude mortality rate. Crude and under-5 mortality rates are higher among the displaced than the non-displaced population. However, these differences are not statistically significant. The design effect for crude mortality was 2.93.

The CMR in males is higher than that among females (see Table 10). This difference is statistically significant (p=0.0005). There is no significant difference between males and females under 5 years of age. Mortality among those IDPs living in organized camps and spontaneous settlements compared with IDPs living among the host community and affected residents was also analyzed. Although the CMR and under 5 mortality rates are higher among IDPs living in camps and spontaneous settlements, these difference are not statistically significant. If the missing are classified as dead, the difference in CMR becomes significant (p=.026).

Of the 81 persons who died during the recall period, cause of death was not reported for 39 (48.2%). Table 11 shows cause of death for those for whom it was reported. However, because of small numbers, confidence intervals are wide.

Of the 13 reported deaths due to violence, none were among those less than 5 years of age. There was one reported violent death among individuals 5–14 years of age. The other 12 violent deaths occurred among those aged 15 years and older. Of the 11 deaths in the older age group for whom gender was reported, nine were among males.

LIMITATIONS

This survey has several important limitations. It is not representative of the entire population of Darfur. Additionally, the survey cannot be considered representative of populations living in areas inaccessible due to insecurity throughout the survey period. These populations for the most part are located in North Darfur state. The survey does not adequately represent SLM/A–controlled areas as only one such area selected was actually sampled. An important group not represented by the survey are populations which have yet to be identified by the UN as crisis affected. These would not have been included in the sampling frame.

The survey gives one single estimate for acute malnutrition for all three Darfur states. It is not possible to compare malnutrition rates between states. Although IDPs living within and outside camps as well

as crisis affected residents are included in the survey, sample sizes do not permit comparisons between each group. Additionally, this survey cannot be compared with other surveys which included a different population (often those living only in camps). The survey was not designed to look at causes of malnutrition, and therefore analysis cannot be performed to look at causal associations.

Although the survey collected information on age, among children aged 6–59months, age may not have been determined with precision. Therefore, age breakdown for weight-for-age (under weight) and height-for-age measurements (chronic malnutrition) are not reported. Assessment of clinical signs for angular stomatitis and vitamin C was not standardized across the survey, due to a lack of clinically trained staff. Therefore no conclusions can be drawn about the prevalence of these micronutrient deficiencies. The prevalence of anemia and vitamin A deficiency can be calculated only for children 6–59 months of age and their mothers. These data are not valid for all women of reproductive age, older children or men. In addition, the sample size for pregnant women is too small to be reliable. Additionally, results from testing of dried blood spots for vitamin A levels will not be available for a further 8 weeks.

DISCUSSION

This is the first survey to give one overall estimate for acute malnutrition among the crisis-affected population in Darfur since the crisis began 18 months ago. It is also the first Darfur-wide survey to estimate the prevalence of micronutrient deficiencies. Results suggest that the nutritional status among the estimated 1.6 million persons identified by the UN as crisis-affected as of August 2004 is alarming and that coverage of nutrition and essential public health programs is poor.

Humanitarian relief agencies in Darfur are operating under difficult circumstances. It is a challenging environment in which to provide large-scale relief efforts. Staff, both national and international, continue to be exposed to security risks while carrying out programs and delivering services. Additionally, extremely poor infrastructure continues to hamper delivery of commodities in many areas. The observations and recommendations contained within this report must be considered in the broader context of security and logistical feasibility.

The prevalence rate of malnutrition among children 6–59months is elevated and indicates that the nutritional situation in Darfur is serious. Additionally, micronutrient deficiencies are widespread among women and children, particularly anemia and vitamin A and iodine deficiency. In the framework of nutrition in emergencies, malnutrition rates above 10% call for interventions. Given the context of the situation in Darfur, with elevated rates of diarrheal disease, continued reporting of measles cases, and low measles vaccination coverage, in conjunction with the prevalence of malnutrition, specific interventions are needed. Those include a general ration, blanket supplementary feeding, and therapeutic feeding. Ideally, before additional nutrition interventions are established, the first action should always be to improve the general ration.
While the quantity of food aid reaching Darfur and the number of recipients has increased substantially since April, the general ration distributed during the recall period of the survey was inadequate in terms of commodities and calories. Many households received only a single commodity ration. More than half of households were missing oil, pulses, and CSB in the month of September, severely reducing the amount of micronutrients available in the general ration distributed. For these households, only 450 grams of cereal per person per day would have been distributed. That equates to 1,494 kcal

per person per day, meeting only 71% of the minimum caloric requirement of 2,100 kcal per person per day. The distribution of the ration has also been inconsistent, with significant time gaps between ration distributions in some areas. Logistical constraints associated with both the rainy season and security further hamper ration distributions. For example, much of the food distributed in West Darfur during the previous months of the rainy season had been air-dropped, limiting the ability to include oil in the ration. At the time of the survey, the WFP policy for temporarily substituting foods missing in the general ration to preserve the energy and protein content of the ration was not applied. Furthermore, there is no retroactive distribution of commodities once they become available. Therefore, the ration has not consistently met the nutritional needs of the population.

Cereals distributed in Darfur are either whole grain wheat or whole grain sorghum. In the milling process, there are losses which occur, especially for sorghum. For white sorghum, losses due to the milling process are estimated at 5-7% and for red sorghum at 30-35%. Milling losses should be taken into account during ration planning so that post-milling, individuals will have access to a ration providing 2100 kcal.

Given the high prevalence of acute malnutrition, there is a need for selective feeding programs, both to avert the mortality associated with malnutrition, as well as to prevent vulnerable populations from becoming malnourished. Feeding programs are still not operational in some areas and those functioning appear to have had limited success thus far. This survey found that programmatic coverage for supplementary feeding programs is below acceptable cutoffs. While there are particular challenges to conducting such programs in Darfur, it should be possible even within these constraints to improve coverage, especially in camps where beneficiaries are concentrated in one location.

A comprehensive review of feeding programs should be undertaken immediately to identify gaps in programs and improve coverage. While the survey was not designed to determine causes affecting the success of supplementary feeding programs, field consultations indicate that protocols, capacity of implementing partners, strategies for outreach, lead sector coordination, commodities provided and used, elevated defaulting rates, and protection issues should all be included in the review. UNICEF, WFP, and implementing partners must all be involved in this process. It is essential that a full supplementary food basket- CSB, oil and sugar- be provided. The absence of commodities increases the difficulties of implementing programs effectively

In July, WFP recommended the initiation of blanket supplementary feeding for all children 6–59 months of age and pregnant and lactating women. Due to missing commodities and operational difficulties, the program was not widely implemented in Darfur. It is recommended that the move from supplementary feeding from a curative program of targeting to a preventative program of blanket supplementary feeding be made operational as quickly as possible. During the transition, which may be influenced by security and logistics, it is crucial that targeted supplemental feeding continue with efforts to improve coverage and performance. It is important to emphasize that supplementary food rations should not be used to compensate for an inadequate ration. Without providing a sufficient general ration, supplemental feeding commodities are unlikely to reach targeted groups and moderate and acute malnutrition will persist.

With needs outpacing resources there is a difficult decision between improving the general ration and expanding beneficiary numbers, but reaching people with only a single commodity will neither prevent malnutrition nor ameliorate the situation. With this is mind, it is important that a balance between the

beneficiary numbers and the sufficiency of the ration be sought. Insufficient rations, especially single commodity rations, will not appropriately address the overall nutritional status of the population. Supplementary feeding programs operating in the absence of a full general ration will not achieve their objective of preventing or curing malnutrition. Supplementary feeding cannot be seen as a long term solution to a food insecurity crisis. A combined approach of a full general ration with selective feeding programs to support the needs of vulnerable populations is needed.

As previously described, micronutrient deficiency diseases (MDD) are of concern in this population. Ensuring the delivery of fortified blended foods, such as CSB, and oil (vitamin A fortified) as part of the general ration will increase the micronutrient content of the ration and help to prevent these deficiencies. Additionally, a blanket supplementary feeding program that includes these commodities will help to channel micronutrients specifically to women and children, who are among the most susceptible to the detrimental effects of micronutrient deficiencies. As a long-term approach to preventing MDD, fortification of cereals at the milling point may be a possible intervention. However, in the emergency phase of response it is not a feasible solution to addressing and preventing MDD. Providing the full general ration and implementing blanket supplementary feeding should be a priority.

Iodine deficiencies disorders (IDD), assessed in this survey by the prevalence of goiter among women, are a significant threat to both health and development in Darfur. IDD has negative health outcomes including- miscarriages and stillbirths, mental defects and deaf-mutism, as swell as inhibiting cognitive development. While the prevalence of IDD is not a consequence of the current crisis, it is still important to address it as a health problem. As an immediate treatment for iodine deficiency, iodized oil capsules should be considered, with a particular emphasis on targeting pregnant women. Iodized salt has been included in the designed ration, but has been infrequently distributed. Iodized salt must be consistently included in the distributed general ration. It is recommended that the quantity of salt be increased from 5grams to 10 grams, thereby increasing the amount of iodized salt available to beneficiaries, as iodized salt is not readily available in all markets.

Anemia among children and women is of public health significance. The prevalence of anemia in children is twice the 20% cut-off for serious consideration of interventions to address the situation. While the cause of anemia was not assessed during the survey, iron deficiency is typically a main cause with other contributing factors such as nutritional deficiencies (vitamins A and B), parasitic infections (intestinal helminths) and chronic disease. WHO recommends that prevention of iron deficiency be an integral part of nutrition programming in emergencies, because of the negative health consequences including increased maternal and perinatal mortality and increased susceptibility to infections. Anemia prevention can be based upon dietary interventions including food fortification and supplementation. Ensuring the distribution of CSB in the general ration consistently is one approach to increasing the amount of iron available in the overall ration. A well implemented blanket supplementary feeding program that includes CSB would also increase the iron content in the overall diet. Supplementation through health clinics and selective feeding programs should be considered, particularly for those individuals identified as anemic.

Reported coverage with measles vaccine among children aged 9–59 months in this survey is low, despite the recently conducted measles vaccination campaign. A mop-up campaign is urgently needed and every opportunity to deliver measles vaccine should be explored. The Federal Ministry of Health in Sudan has reported 93% coverage across accessible areas in Darfur.[20] While it was acknowledged that many areas were not reached, owing to security and logistical reasons, measles outbreaks have

continued to be reported in West and North Darfur, even after the measles immunization campaign.[20] Eleven cases were self-reported in the survey. Measles prevention must be a priority in emergencies given the elevated malnutrition and mortality rates associated with outbreaks. For this reason, urgent mop-up campaigns are necessary, particularly in areas where the population is living under crowded conditions, such as camps, spontaneous settlements and towns with large populations of IDPs. Mop-up should not be confined to areas and populations that were missed in the previous campaign. In camps, a system must be established to vaccinate newcomers. Outside of such settings, the upcoming National Immunization Days for polio could possibly include mop-up measles vaccination, at least in the 1.6 million population identified as crisis affected. Consideration should be given to lowering the age of vaccination from 9 months to 6 months, as younger children are at greatest risk of measles death.

Vitamin A supplementation rates are also low, although coverage is higher than for measles. This is most likely a result of additional opportunities for vitamin A supplementation in supplementary feeding programs and at primary health facilities. The planned inclusion of vitamin A in the upcoming National Immunization Days should increase coverage among children and adolescents. However, 16% of mother reported experiencing night-blindness in their most recent pregnancy. A strategy is needed to reach this target group.

Reported diarrhea among children aged 6–59 months in the 2 weeks before the survey was 41.0%, and is indicative of poor water and sanitation coverage. This is a high prevalence and greater than the rate found in the most recent MICS survey.[5] A significant portion of households, 39.7% reported no access to a latrine. Data on access to a sufficient quantity of water of adequate quality were not collected at the household level. However, several large outbreaks of hepatitis E have been reported among this population suggesting that the quality of water is not adequate. Efforts to improve water and sanitation must be made, and gains may more easily be achieved in the short term in camps.

Other communicable diseases frequently reported among children 6–59 months of age, such as malaria/fever and respiratory infections, further exacerbate malnutrition. While data on worm infections was not specifically collected, intestinal parasite infections appear to be common. Parasitemia in relation to malaria and intestinal helminths, may be a contributing factor to the high prevalence rate of anemia. However, the cause of anemia was not determined by the survey, it is most likely due to a combination of parasitic infections and a diet low in iron.

The relationship between malnutrition and infection is synergistic, where malnutrition increases a child's susceptibility to infections and infection increases the likelihood of malnutrition. Malnutrition cannot be addressed in a vacuum of food and nutritional interventions. Attention must be paid to the basic causes of morbidity among children. If water and sanitation are not improved, gains in nutritional status brought about by improved food and nutrition programs will be negated. This is particularly important and perhaps more easily addressed among displaced populations in camps or those settled in larger groups among the resident population. Hygiene education activities carried out during distributions (general and supplementary), in selective feeding programs, and in community based campaigns may also help to reduce diarrheal diseases.

The overall crude mortality rate among the survey population was 0.72 (95% CI: 0.45-0.99) which is not above the emergency benchmark of 1 per 10,000 deaths per day. However, the limitations mentioned above are particularly relevant for mortality. The following must be considered when interpreting these data:

1) Mortality rates are averaged over a 7-month period.
2) Mortality data represent average mortality across a population of close to 1.6 million persons, including sizeable resident and mixed-resident and IDP populations. There may have been sub-population groups or geographic areas where mortality was higher.
3) The survey does not represent mortality in areas that were insecure at the time of the survey (mostly in North Darfur) or SLM/A areas, where conflict related deaths may have been higher.
4) Finally, among the displaced, the mean length of displacement was 7.5 months. Because the recall period for the survey was 7 months, deaths prior to displacement will not have been captured, some of which may be conflict related.

The crude mortality rate is significantly higher for males than for females. This may be related to causes of death. Unfortunately, no cause was reported for a large proportion of deaths which limits the ability to examine this finding. However, 35% (95% CI: 14.4, 55.8) of all reported deaths resulted from violence, mostly among older males. This suggests that the increased mortality rate among males reflects a greater number of violence-related deaths among adult males compared to females. If this is the case, there are programmatic implications as most interventions target women and children under 5 years of age. The CMR among those living in camps and spontaneous settlements appears to be higher than that among IDPs living mixed in with the local population and effected residents. However, this difference only reaches statistical significance if the missing are classified as dead. It is particularly important in crowded settings that strong preventive public health programs are in place. Otherwise exposure to diseases such as measles at a higher infective dose can increase the case fatality ratio. Additionally, these populations may be easier to target for such interventions as they are gathered in one location.

Other surveys conducted in camp populations in Darfur have reported mortality levels above the emergency threshold. Two surveys carried out among a mixed population of IDPs and residents report mortality at around the expected baseline level for Africa.[21] However, since this study is the first to date to look at the entire crisis-affected population, IDPs as well as residents, it is not possible to compare the results with these other surveys. We emphasize that mortality rates in this survey do not predict future mortality. With high levels of malnutrition and communicable disease, substantial mortality can be expected in the coming months if conditions do not improve. This survey suggests that there is a window of opportunity duirng which effective- interventions implemented immediately- may prevent future mortality.

As previously mentioned the survey was not intended to be an evaluation of programs. Further studies are required to determine the factors limiting program coverage and success. In terms of program uptake, there may be a role for qualitative research techniques to assist community and health workers in assessing why coverage of certain health interventions is low. In this situation of poor security and difficult access, it may be necessary to develop a basic package of health interventions that can be delivered at intervals. Such campaigns might include immunization, vitamin A supplementation, de-worming, iron supplementation and presumptive treatment of malaria. These interventions should only serve as a stop-gap measure while efforts are made to improve long-term clinic based preventive health services.

CONCLUSIONS

The situation in Darfur is critical and insecurity continues to hamper humanitarian interventions. Improving and providing a full general ration should be a priority to address malnutrition and micronutrient deficiencies. This alone, however, is not sufficient to reduce the prevalence of malnutrition. It is essential that measles coverage be increased, especially where crowded conditions exist. A basic minimum package of public health interventions must accompany food and nutrition activities. Health and nutrition activities cannot exist in isolation; they need to be integrated in order to best serve the population in need. It is important to recognize that there are limitations in the ability to cover and reach all areas of Darfur. However, in those areas, which are being reached, especially camps and spontaneous settlements where conditions are extremely crowded, programs must be improved to meet minimum standards.

Crude and under-5 mortality rates averaged across the entire 1.6 million crisis-affected population did not surpass emergency thresholds for the 7 months before the survey. However, data suggest that mortality is highly clustered and mortality rates may be substantially higher among sub-groups. With high levels of malnutrition, substantial mortality is to be expected in the coming months if conditions continue to deteriorate. The time to act in order to prevent excess mortality is now.

RECOMMENDATIONS

General Ration

- Increase the distributed general ration to meet the 2100 kcal minimum requirement
- Provide a full general ration, consisting of a cereal, pulse, CSB, fortified oil and salt
- If commodities are not available for the current distribution, compensation for missing commodities per WFP guidelines must be provided
- When planning a general ration, account for losses due to milling

Selective Feeding

- Blanket supplementary feeding should be implemented on the ground for all children under 5 years of age and pregnant and lactating women
- Targeted supplementary feeding should continue while blanket SFP is established. However, these programs must expand to properly identify and treat moderately malnourished children
- Ensure that proper commodities (CSB, oil and sugar) be provided for supplementary feeding
- WFP and UNICEF in conjunction with implementing partners should undertake a review of protocols and programs for supplementary and therapeutic feeding
- Regular reporting of key indicators of selective feeding programs should be collected and analyzed on an ongoing basis

Micronutrient Deficiencies

- Discuss with other partners the use of iodized oil capsules for the treatment of iodine deficiency among women and children
- Increase the amount of iodized salt provided in the ration from 5 to 10 grams, and ensure that it is distributed in small packets and not by scoops

Measles

- Immediate mop-up campaign targeting children missed by the previous campaign is needed as soon as possible. Consider adding a measles component to the upcoming National Immunization Days for polio
- Increase efforts to reach previously inaccessible areas for the measles campaign.
- Make immediate mop-up campaigns for measles a priority in camps and set up a system in each camp for vaccinating new arrivals
- Lower the lower-age limit for measles vaccination to 6 months from 9 months

Overall Health Recommendations

- Improve coverage of latrines
- Improve access to water in quantity and quality, particularly in camp settings
- Hygiene education campaigns and other feasible public health activities should be implemented during distributions, general ration and supplementary feeding
- Increase the uses of insecticide treated nets, accompanied by a strong educational campaign on their proper use
- Increase access to basic primary health care services, by supporting existing clinics or mobile outreach

Table 1. Characteristics of Households, Darfur Region, Sudan, September 2004

Characteristic	Number (%)	95% CI
Houses		
North	282 (32.0)	------
West	342 (38.9)	------
South	256 (29.1)	------
Latrine		
Pit latrine	489 (59.9)	(50.1, 68.9)
No latrine	371 (39.7)	(30.7, 49.3)
Displacement		
Displaced	541 (64.7)	(54.1, 73.9)
Non-displaced	324 (35.3)	(26.0, 45.9)
Shelter		
Plastic sheeting	281 (34.1)	(22.67, 47.7)
Tent	11 (1.4)	(0.65, 2.9)
Traditional house	527 (63.2)	(48.6, 75.8)
No shelter	12 (1.3)	(0.35, 4.9)
Internally displaced households		
Latrine		
Pit latrine	288 (54.7)	(42.4, 66.4)
No latrine	247 (44.9)	(33.4, 57.2)
Shelter		
Plastic sheeting	278 (52.5)	(37.1, 67.4)
Tent	10 (1.9)	(0.9, 3.9)
Traditional house	212 (43.5)	(28.2, 60.2)
No shelter	12 (2.1)	(0.6, 6.9)

Table 2. Prevalence of Acute Malnutrition, Weight-for-Height Z-Scores, Among Children 6–59 Months of Age, Darfur Region, Sudan, September 2004, (n=844)

Acute Malnutrition	Prevalence	95% CI
Global acute malnutrition	21.8%	(18.2, 25.3)
Severe acute malnutrition	3.9%	(2.3, 5.6)
Edema	8 cases(24% of severe)	-

Table 3. Prevalence of Acute Malnutrition, Weight-for-Height Percent of Median, Among Children 6–59 Months of Age, Darfur Region, Sudan, September 2004 (n=844)

Acute Malnutrition	Prevalence	95% CI
Global acute malnutrition	16.4%	(13.5, 19.3)
Severe acute malnutrition	2.5%	(1.5, 3.4)
Edema	8 cases	-

Table 4. Prevalence of Anemia, Hemoglobin Concentration g/dL, Among Children 6–59 Months of Age, Darfur Region, Sudan, September 2004 (n=507)

Anemia	Number (%)	95 % CI
Anemic (< 11.0 g/dL)	285 (55.3)	(50.4, 60.2)
Non-anemic (≥ 11.0 g/dL)	222 (44.7)	(39.8, 49.6)

Table 5. Reported Illness (2-Week Recall) Among Children 6–59 Months of Age, Darfur Region, Sudan, September 2004 (n=885)

Illness	Number (%)	95% CI
Illness in last 2 weeks	657 (74.9)	(68.9, 80.9)
Diarrhea	346 (41.0)	(33.8, 48.3)
Fever	254 (30.7)	(25.2, 36.2)
ARI	160 (18.0)	(14.5, 21.6)
Malaria	63 (6.5)	(3.9, 9.0)
Measles	11 (2.1)	(0, 4.5)

Table 6. Measles and Vitamin A Coverage Among Children Aged 6-59 Months and 9 to 59 Months, Darfur Region, Sudan, September 2004

Program	Coverage*	95% CI
Measles coverage in previous 6 months		
Children 6-59 months	65.1%	(55.7, 74.6)
Children 9-59 months	66.7%	(56.8, 76.6)
Vitamin A coverage in previous 6 months		
Children 6-59 months	74.1%	(67.2, 81.1)
Children 9-59 months	74.2%	(66.8, 81.5)

*** 95% coverage needed to prevent measles outbreaks**

Table 7. Characteristics of Mothers of Children Aged 6–59 Months, Darfur Region, Sudan, September 2004

Characteristic	Number (%)	95% CI
Pregnant		
Yes	86 (14.8)	(12.3, 17.4)
No	500 (84.7)	(81.7, 87.4)
Breastfeeding		
Yes	285 (50.7)	(46.4, 54.9)
No	298 (49.3)	(45.1, 53.6)
Illness past 2 weeks		
Yes	150 (26.4)	(19.4, 33.4)
No	401 (73.6)	(66.6, 80.6)
Nightblindness in last pregnancy		
Yes	93 (15.6)	(9.1, 21.8)
No	483(84.5)	(78.2, 90.9)

Table 8. Micronutrient Deficiencies Among Mothers of Children Aged 6–59 Months, Darfur Region, Sudan, September 2004

Deficiency	Number (%)	95% CI
Non-pregnant Women		
Anemia		
Yes	73 (26.2)	(20.6, 31.8)
No	189 (73.8)	(68.2, 79.4)
Iodine		
Yes	116 (23.6)	(15.6, 31.5)
No	340 (76.4)	(68.5, 84.3)
Pregnant Women		
Anemia		
Yes	9 (22.3)	(20.6, 31.8)
No	189 (73.8)	(68.2, 79.4)

Table 9. Crude and Under Five Mortality Rates Among Sample of Displaced Persons Compared With Crisis-Affected Residents in Darfur, Sudan, February–September 2004.

	Mortality rates expressed as deaths/10,000/day (95% Confidence Interval)			
	All population (n=5,347)	**Displaced (n=3,3302)**	**Non-displaced (n=1,994)**	**Threshold**
CMR*	0.72 (0.45-0.99)	0.88 (0.49-1.27)	0.46 (0.21-0.71	1/10,000
U5MR†	1.03 (0.38-1.68)	1.15 (0.27-2.03)	0.80 (0.07-1.53)	2/10,000

*CMR= crude mortality rate as deaths per 10,000 persons per day
†U5MR= mortality rate for children younger than 5 years as deaths per 10,000 under 5 years, per day

Table 10. Crude and under-five mortality rates by gender and residential status among sample of crisis affected populations in Darfur, Sudan, February-September 2004.

Category	CMR* (95%CI)		U5MR† (95%CI)
Gender	Male	0.95 (0.68-1.22)	0.64 (0.25-1.03)
	Female	0.40 (0.13-0.67)	1.14 (0.16-2.12)
Residential status	IDPs± camps and spontaneous settlements	1.07 (0.36-1.78)	1.25 (0.00-2.62)
	IDPs integrated with residents	0.55 (0.37-0.73)	0.69 (0.16-1.22)

*CMR= crude mortality rate as deaths per 10,000 persons per day
†U5MR= mortality rate for children younger than 5 years as deaths per 10,000 under 5 years, per day
‡IDP= internally displaced persons

Table 11. Reported Cause of Death Among Sample of Crisis Affected Populations in Darfur, Sudan, February-September 2004.

Cause	Number (%)	95% Confidence Interval
Measles	3 (6.9)	(0.0, 15.5)
Tetanus	2 (7.2)	(0.0, 20.6)
Diarrhea	6 (9.4)	(4.3, 14.5)
Meningitis	1 (1.7)	(0.0, 5.2)
Respiratory infection	9 (21.6)	(7.0, 36.2)
Unintentional injury	5 (11.7)	(0.0, 24.1)
Violent injury	13(35.1)	(14.4, 55.8)

Figure 1. Distribution of Weight-For-Height Z-Scores Among Children 6–59 Months of Age, Darfur Region, Sudan, September 2004

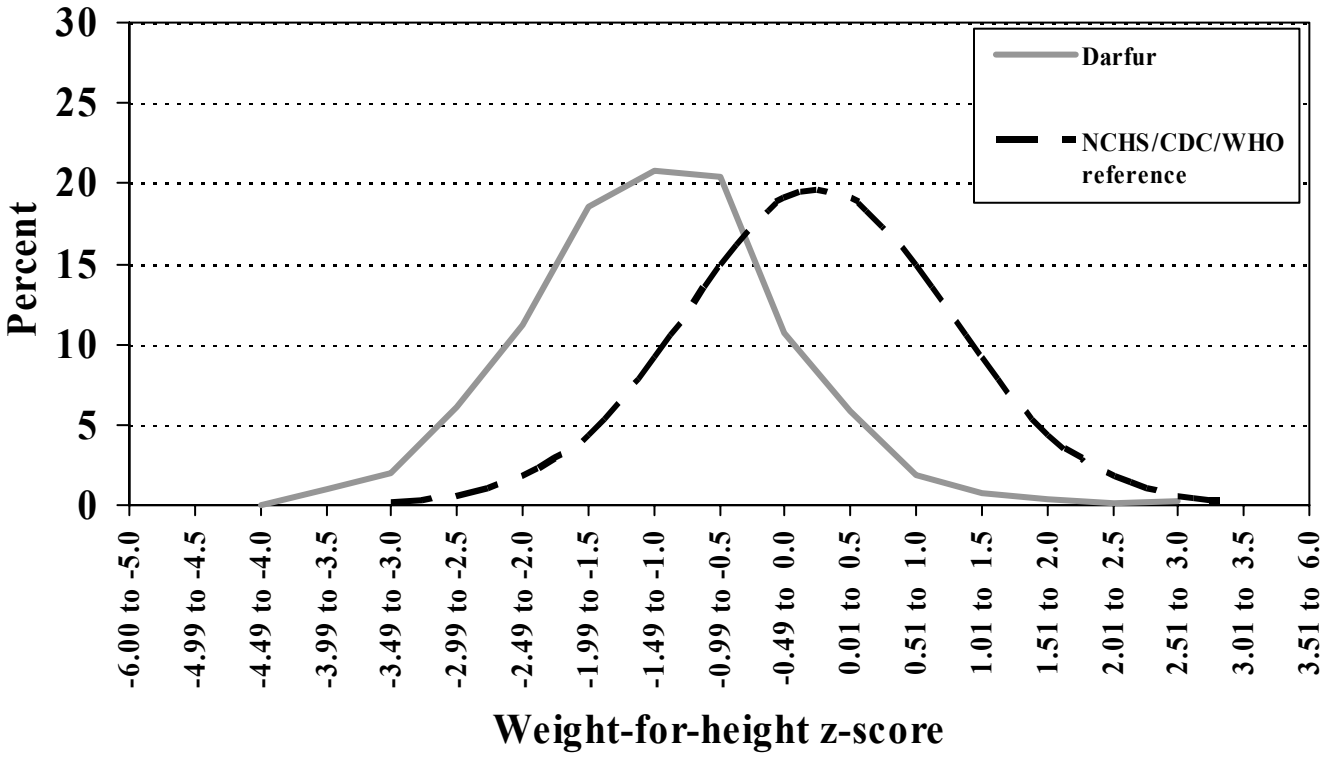
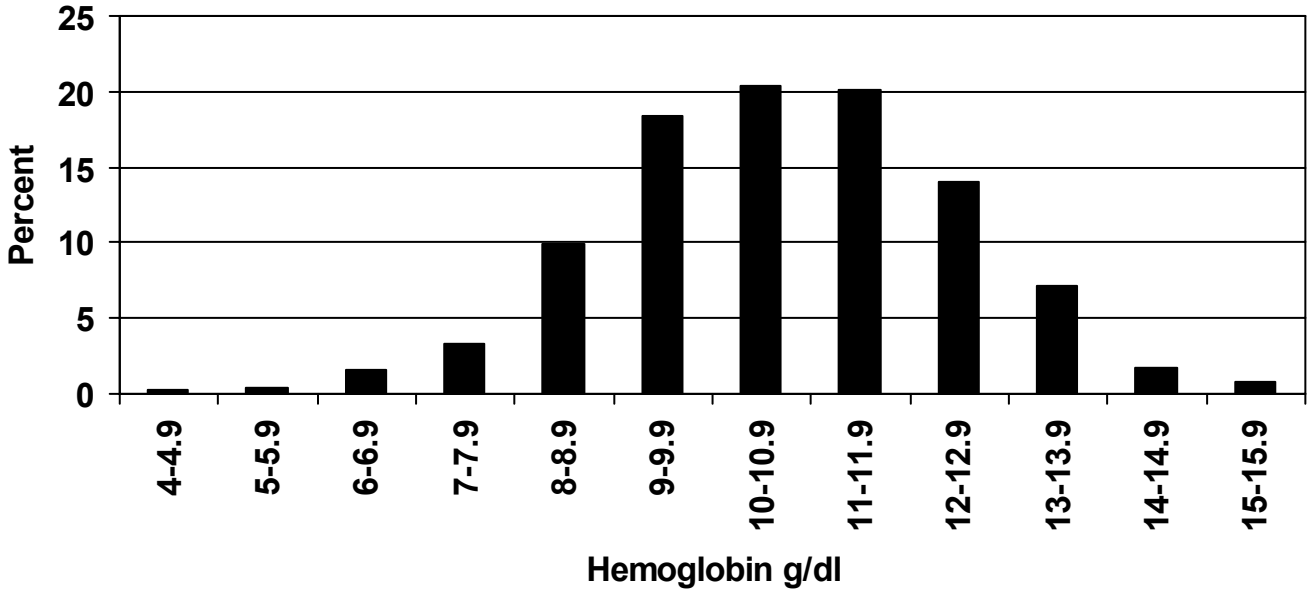


Figure 2. Distribution of Hemoglobin Concentrations g/dL Among Children 6–59 Months of Age, Darfur Region, Sudan, September 2004



Annex I: Population Framework Used for Sampling

WEST DARFUR

Province: El Geneina

Location	Estimated IDPs	Estimated Residents	Returnees	Total Affected	Cumulative Total Affected
Al Geneina	54,731	N/A	N/A	54,731	54,731
Azirni	2,406	3,063	N/A	5,469	60,200
Goker	2,399	N/A	N/A	2,399	62,599
Kafani	200	2,000	N/A	2,200	64,799
Kerenek	17,847	3,085	N/A	20,932	85,731
Masteri	9,664	3,595	7,315	20,574	106,305
Morni	63,376	4,592	N/A	67,968	174,273
Sanindadi	1,774	1,962	N/A	3,736	178,009
Sisi	4,104	N/A	N/A	4,104	182,113
Um Tagouk	14,376	4,878	N/A	19,254	201,367
Warada	N/A	3,750	N/A	3,750	205,117

Province: Habilla

Location	Estimated IDPs	Estimated Residents	Returnees	Total Affected	Cumulative Total Affected
Abu Dahiyia	N/A	2,934	N/A	2,934	208,051
Ararah	4,840	3,457	N/A	8,297	216,348
Beida	3,227	9,079	N/A	12,306	228,654
Foro Buranga	7,010	19,114	N/A	26,124	254,778
Gemiza	N/A	4,000	N/A	4,000	258,778
Gobe	7,953	N/A	N/A	7,953	266,731
Habilah	11,892	3,353	N/A	15,245	281,976
Kanvo Haraza	1,524	2,099	N/A	3,623	285,599
Mangarasa	992	N/A	N/A	992	286,591
Nour El Huda	N/A	2,423	N/A	2,423	289,014
Sawani	2,118	N/A	N/A	2,118	291,132
Tawang	3,357	N/A	N/A	3,357	294,489

Province: Kulbus

Location	Estimated IDPs	Estimated Residents	Returnees	Total Affected	Cumulative Total Affected
Abosourage	9,817	N/A	N/A	9,817	304,306
Aro Sharow	4,162	305	N/A	4,467	308,773
Arwa	5,178	N/A	N/A	5,178	313,951
Batro	2,941	N/A	N/A	2,941	316,892
Buri	1,412	1,151	N/A	2,563	319,455

Dohoush	3,357	N/A	N/A	3,357	322,812
Haillate	N/A	4,141	N/A	4,141	326,953
Hajar laben	2,774	N/A	N/A	2,774	329,727
Higleiga	2,932	N/A	N/A	2,932	332,659
Jabel moon	N/A	9,000	N/A	9,000	341,659
Kondobe	5,270	N/A	N/A	5,270	346,929
Kondobe Nomads	N/A	1,012	N/A	1,012	347,941
Kouta	N/A	1,146	N/A	1,146	349,087
Kulbus	2,541	3,983	N/A	6,524	355,611
Selea	5,911	1,708	N/A	7,619	363,230
Sirba	3,990	1,861	N/A	5,851	369,081
Sirba Nomads	N/A	3,070	N/A	3,070	372,151
Wadi Bardi	4,156	N/A	N/A	4,156	376,307

Province: Jabel Marrah

Location	Estimated IDPs	Estimated Residents	Returnees	Total Affected	Cumulative Total Affected
Gildo	7,315	N/A	N/A	7,315	383,622
Golo	32,544	N/A	N/A	32,544	416,166
Gornie	1,715	N/A	N/A	1,715	417,881
Nerteti	14,761	5,880	N/A	20,641	438,522
Rokero	1,500	600	N/A	2,100	440,622

Province: Mujkar

Location	Estimated IDPs	Estimated Residents	Returnees	Total Affected	Cumulative Total Affected
Mukjar	13,573	N/A	N/A	13,573	454,195

Province: Wadi Salhi

Location	Estimated IDPs	Estimated Residents	Returnees	Total Affected	Cumulative Total Affected
Bindizi	20,414	N/A	N/A	20,414	474,609
Deleij	16,345	3,788	N/A	20,133	494,742
Garsila	31,788	N/A	N/A	31,788	526,530
Tanako	5,000	N/A	N/A	5,000	531,530
Um Kher	13,312	4,000	N/A	17,312	548,842
UmDukhan	6,262	N/A	N/A	6,262	555,104

Province: Zalingei

Location	Estimated IDPs	Estimated Residents	Returnees	Total Affected	Cumulative Total Affected
Nyala	N/A	40,000	N/A	40,000	595,104
Zalingei	56,708	N/A	N/A	56,708	651,812

NORTH DARFUR

Province: El Fasher

Location	Estimated IDPs	Estimated Residents	Returnees	Total Affected	Cumulative Total Affected
Abushouk	36,580	N/A	N/A	36,580	36,580
El Fasher	23,904	N/A	N/A	23,904	60,484
Korma	N/A	6,000	N/A	6,000	66,484
Kungara	2,653	2,123	N/A	4,776	71,260
Shangel Tobia	8,860	N/A	N/A	8,860	80,120
Tawilah	24,284	7,287	N/A	31,571	111,691
Teyiba	2,480	N/A	N/A	2,480	114,171
Um Burnga	1,087	502	N/A	1,589	115,760
ZamZem	14,149	N/A	N/A	14,149	129,909

Province: Kebkabyia

Location	Estimated IDPs	Estimated Residents	Returnees	Total Affected	Cumulative Total Affected
Abughusoon	1,500	400	N/A	1,900	131,809
Al Sharef Bin Hussein	5,000	N/A	N/A	5,000	136,809
Barde	5,000	1,200	N/A	6,200	143,009
Birkasaira	7,421	N/A	N/A	7,421	150,430
Daba Toga	1,500	N/A	N/A	1,500	151,930
Eleikersha	1,300	N/A	N/A	1,300	153,230
Garah Fergwiya	N/A	1,520	N/A	1,520	154,750
Kabkabiyah	49,264	20,791	N/A	70,055	224,805
Malha	13,053	24,131	N/A	37,184	261,989
Mellit	6,000	N/A	N/A	6,000	267,989
Sanihaya	2,000	N/A	N/A	2,000	269,989
Saraf Omra	15,199	14,490	N/A	29,689	299,678
Sayah	4,000	12,000	N/A	16,000	315,678
Umajaaja	1,500	N/A	N/A	1,500	317,178

Province: Kutum

Location	Estimated IDPs	Estimated Residents	Returnees	Total Affected	Cumulative Total Affected
Abdel Shakor	5,446	N/A	N/A	5,446	322,624
Anka	3,045	N/A	N/A	3,045	325,669
Areida	4,713	N/A	N/A	4,713	330,382
Damrat Masry	1,200	N/A	N/A	1,200	331,582
Damrt E. Abdelbagi	5,690	N/A	N/A	5,690	337,272

Dissa	7,048	N/A	N/A	7,048	344,320
El Dur	8,446	N/A	N/A	8,446	352,766
Fato Barno	2,927	N/A	N/A	2,927	355,693
Karnoi	21,529	N/A	N/A	21,529	377,222
Kutum	55,445	N/A	N/A	55,445	432,667
Por Saieed	900	N/A	N/A	900	433,567
Um Berro	30,785	N/A	N/A	30,785	464,352
Um Sayala	1,120	N/A	N/A	1,120	465,472
Um shidig	3,055	N/A	N/A	3,055	468,527

Province: Tina

Location	Estimated IDPs	Estimated Residents	Returnees	Total Affected	Cumulative Total Affected
Tina	17,686	N/A	N/A	17,686	486,213

SOUTH DARFUR

Province: Kass

Location	Estimated IDPs	Estimated Residents	Returnees	Total Affected	Cumulative Total Affected
Dibis	517	N/A	N/A	517	517
Gemeza Korma	5,735	N/A	N/A	5,735	6,252
Guba	1,615	N/A	N/A	1,615	7,867
Hashaba	953	N/A	N/A	953	8,820
Kass	42,025	12,452	N/A	54,477	63,297
Keliek	1,100	N/A	N/A	1,100	64,397
Kirew	1,004	1,228	N/A	2,232	66,629
Korele	2,336	N/A	N/A	2,336	68,965
Limo	N/A	4,814	N/A	4,814	73,779
Nyamma	1,630	N/A	N/A	1,630	75,409
Singita	1,575	N/A	N/A	1,575	76,984
Thur	7,688	2,563	N/A	10,251	87,235

Province: Nyala

Location	Estimated IDPs	Estimated Residents	Returnees	Total Affected	Cumulative Total Affected
Abu Jabra	2,962	N/A	N/A	2,962	90,197
Abu Karenka	1,131	N/A	N/A	1,131	91,328
Abu Salala	974	N/A	N/A	974	92,302
AbuAjoura	N/A	59,270	N/A	59,270	151,572
Adilla	5,415	N/A	N/A	5,415	156,987
Adwa	3,812	N/A	N/A	3,812	160,799

Al Gora	1,185	N/A	N/A	1,185	161,984
Al Mazroub	2,377	N/A	N/A	2,377	164,361
Beliel	4,940	N/A	N/A	4,940	169,301
Buram	N/A	50,000	N/A	50,000	219,301
Dagadousa	2,873	N/A	N/A	2,873	222,174
Domma	5,000	N/A	N/A	5,000	227,174
Firdos	4,378	N/A	N/A	4,378	231,552
Gorouf	7,000	N/A	N/A	7,000	238,552
Habouba	400	N/A	N/A	400	238,952
Jad Elsid	1,516	N/A	N/A	1,516	240,468
Kalma	73,658	N/A	N/A	73,658	314,126
Kubum	2,617	N/A	N/A	2,617	316,743
Mellam	12,083	1,206	N/A	13,289	330,032
Muhajiria	3,645	N/A	N/A	3,645	333,677
Netiega	1,417	N/A	N/A	1,417	335,094
Nyala Karary	2,001	N/A	N/A	2,001	337,095
Sania Dalaiba	3,505	715	N/A	4,220	341,315
Sharef	3,121	N/A	N/A	3,121	344,436
Shareg Eljabel	30,680	N/A	N/A	30,680	375,116
Shataya	7,991	N/A	N/A	7,991	383,107
Sheria	N/A	5,000	N/A	5,000	388,107
Teisha	9,464	1,000	N/A	10,464	398,571
Um Labassa	643	N/A	N/A	643	399,214
Yara	5,907	3,000	N/A	8,907	408,121

Province: Shareia

Location	Estimated IDPs	Estimated Residents	Returnees	Total Affected	Cumulative Total Affected
Ed Daein	14,481	N/A	N/A	14,481	422,602
Joghana	2,024	N/A	N/A	2,024	424,626
Khor Omer	15,946	N/A	N/A	15,946	440,572
Menwashi	3,467	N/A	N/A	3,467	444,039
Mersheng	11,533	N/A	N/A	11,533	455,572
Sanam El Naga	5,107	N/A	N/A	5,107	460,679
Yassin	N/A	33,000	N/A	33,000	493,679

Annex II: Selection of 55 Clusters with Probability Proportionate to Size from 149 Clusters in C:\CSURVEY\MTOTAL.CSF

Total Relative Size: 1,655,988

West Darfur (18 clusters in 11 locations)

Community Name	Estimated Relative Size	# of Selected Clusters
Al Geneina	54731	1
Masteri	20574	1
Morni	67968	3
Um Tagouk	19254	1
Foro Buranga	26124	2
Gobe	7953	1
Buri	2563	1
Golo	32544	3
Rokero	2100	1
Deleij	20133	1
Zalingei	56708	3

North Darfur (22 clusters in 14 locations)

Community Name	Estimated Relative Size	# of Selected Clusters
Abushouk	36580	1
El Fasher	23904	3
Shangel Tobia	8860	1
Tawilah	31571	2
Birkasaira	7421	1
Kabkabiyah	70055	1
Malha	37184	1
Saraf Omra	29689	2
Sayah	16000	2
Umajaaja	1500	1
Damrt Elsheikh Abdel	5690	2
Kutum	55445	2
Jebel Si	20198	2
Kurbia	2550	1

South Darfur (15 clusters in 12 locations)

Community Name	Estimated Relative Size	# of Selected Clusters
Nyala	40000	1
Kass	54477	1
Limo	4814	1
Thur	10251	1
Buram	50000	1
Domma	5000	1
Kalma	73658	3
Sania Dalaiba	4220	1
Shareg Eljabel	30680	1
Sheria	5000	1
Teisha	10464	1
Yara	8907	1
Khor Omer	15946	1

TOTAL: 55 clusters in 37 locations selected

ANNEX III: Household questionnaire for nutrition survey conducted in Darfur region, Sudan, September 2004

Hello my name is_____ and I'm working with the World Food Programme. We are conducting a survey on the health and nutrition of your family. We would very much appreciate your participation in this survey.

I would like to ask you about the health of your family. We will also weigh and measure your children who are younger than 5 years of age. We would also like take a drop of blood from the finger for mothers and children, to look at anemia and vitamin A. The survey usually takes 45 minutes to complete. Any information that you provide will be kept strictly confidential and will not be shown to other persons. Participation in this survey is voluntary and you can choose not to answer individual questions or all the questions. However, we hope that you will participate in this survey since your views are important. Do you have any questions about the survey? May I begin the interview now?

Your answers will not affect your ration.

Household Questionnaire-Darfur Nutrition Survey, September 2004

Interviewer_____

State: North/ West/ South *(circle)* **Locality**: _____ **Community**: Village / Camp / Town: _____ *(circle)* *(write out)*

Team No: 1 2 3 **Cluster**: _____ **Household No**: _____ **Date (dd/mm): ____/09**

Consent: Read introduction paper. Check once it has been read and if household has given permission.

SECTION A:

1. Respondant: (check)
- ☐ Male head of household
- ☐ Female head of household
- ☐ Other female adult
- ☐ Other male adult

2. **Marital status of HH head (check)**
- ☐ Married (family has one wife)
- ☐ Married (more than one wife)
- ☐ Widowed/widower
- ☐ Never married / single
- ☐ Divorced

3. Is your family currently displaced from your normal place of living? *(circle)* **Y / N / DK** **3a. If YES, how many months has your family lived here?** ☐☐

3b. If YES, where did your family live before? ***(check)***
- ☐ 1. Nearby village (<10 km)
- ☐ 2. Other village/same locality
- ☐ 3. Village/other locality in this state
- ☐ 4. Other state/country (list)_____

SECTION B*: I would now like to ask you about each person who lived in this household* ***at the time of the most recent Eid Al Adha (Wahid)***

First fill out the age column

1. Alive (living in this household)
2. Alive (living elsewhere, migrated) > **If code is 2 or 3, enter month**
3. Died > **If code is 3 enter cause of death from card**
4. Missing/unknown

Person No.	Age (years)	Sex (circle)	Current Status as of TODAY	Month of migration/ death	Cause of death **(Enter code)**	If code 8 or 9, describe
1 (HH head)		**M / F**	**1 2 3 4**			
2		**M / F**	**1 2 3 4**			
3		**M / F**	**1 2 3 4**			
4		**M / F**	**1 2 3 4**			
5		**M / F**	**1 2 3 4**			
6		**M / F**	**1 2 3 4**			
7		**M / F**	**1 2 3 4**			
8		**M / F**	**1 2 3 4**			
9		**M / F**	**1 2 3 4**			
10		**M / F**	**1 2 3 4**			
New Born	Age (years)	Sex (circle)	Current Status as of TODAY	Month of migration/ death	Cause of death **(Enter code)**	If code 8 or 9, describe
11		**M / F**	**1 2 3 4**			
12		**M / F**	**1 2 3 4**			

SECTION C:

4. Do you have a ration card or token? Y / N / Don't know (Show example of ration card)

5. In which months did you receive a general ration? (Read each month)

April	May	June	July	August	September
☐	☐	☐	☐	☐	☐

6. IF household has received food aid (general ration) since July, please tell me how much of each item you received last food distribution.

6b. Sorghum _____ kgs (1 bag = 50 kg)

6c. Wheat _____ kgs (1 bag = 50 kg)

6d. Pulses _____ containers (1.5 kg each)

6e. Oil _____ liters

6f. Blended food _____ containers (1.5 kg each)

7. In the past 7 days, how many days has your household eaten the following items:

	8 How is it prepared? *(check answer if appropriate)*	
	Milled	**Boiled**
7a. _____ Millet	**8a.** ☐	☐
7b. _____ Sorghum	**8b.** ☐	☐
7c. _____ Wheat	**8c.** ☐	☐
7d. _____ Meat/fish		
7e. _____ Dried Vegetables		
7f. _____ Fresh vegetables		
7g. _____ Oil		
7h. _____ Pulses		

9. Does your household have any bednets that are being used while sleeping? Y / N / DK

10. Current shelter (circle one): 1. No shelter 2. Plastic sheeting 3. Tent 4. House

11. Description of toilet facilities available:

☐ Pit latrine

☐ No facility/bush/field

☐ Other

Mother Questionnaire-Darfur Nutrition Survey, September 2004
**** TO BE FILLED OUT FOR EACH WOMAN WITH A CHILD AGED 6-59 MONTHS**

State: North/ West/ South (*circle*) **Province**: _____ **Community**: Village / Camp / Town: _____ (*circle*) (*write out*)

Team No: 1 2 3 **Cluster:** **Household No:** **Date (dd/mm):** **/09 /04**

1. Age (years) ☐☐

2. Are you currently pregnant? Y / N / Don't know

2a. If pregnant, MUAC ☐☐.☐ cm

3. Are you currently breastfeeding? Y / N

4. During the pregnancy of your last child, did you suffer from night blindness (local term) Y / N / Don't know

5. Are you currently enrolled in a supplementary feeding program? Y / N / Don't know

6. Morbidity Question: Have you had any illnesses in the past 2 weeks? What have you had?

(check all that apply)

6a. ☐ No illness

6b. ☐ Watery diarrhea

6c. ☐ Bloody diarrhea

6d. ☐ Cough

6e. ☐ Fever/Malaria

6f. ☐ Other

7. Clinical exam: (use colored card and check if symptom is present)

7a. ☐ Gums bleeding spontaneously

7b. ☐ Angular stomatitis

7c. ☐ Goitre

8. Hemoglobin level ☐☐.☐

9. DBS Y / N ☐

Child (6-59 months) Nutrition Questionnaire-Darfur Nutrition Survey, September 2004
[Respondent of this questionnaire should be the mother]

State: N / W / S **District:** _____ **Area:** Village / Camp / Town: _____
(circle) *(circle)* *(write out)*

Team No: 1 2 3 **Cluster:** _____ **Household No**: _____ **Date (dd/mm):** **_____/09 /04**
(circle)

Child	**Respondent Relationship to child** (1=father, 2=mother, 3=sibling, 4=grandparent, 5=aunt/uncle, 6=other)	**Child age (months)** Use local calendar	**Sex** (Circle one)	**Child Currently enrolled in:** S=SFP T=TFP N=No	**Measles Vaccination** 0=No, 1=yes, by card, 2=yes, no card, 9=unknown	**Vitamin A Capsule Since Wahid?**	**Was your child sick in last 2 weeks? What did they have?** 1. diarrhea 2. measles 3. ARI 4. fever 5. malaria 6. other (list up to 3)	**Weight (kg)**	**Height (cm)**	**Oedema**
Child 1			**M / F**	**S/ T/ N**		**Y/ N/ DK**				**Y / N**
Child 2			**M / F**	**S/ T/ N**		**Y/ N/ DK**				**Y / N**
Child 3			**M / F**	**S/ T/ N**		**Y/ N/ DK**				**Y / N**
Child 4			**M / F**	**S/ T/ N**		**Y/ N/ DK**				**Y / N**
Child 5			**M / F**	**S/ T/ N**		**Y/ N/ DK**				**Y / N**
Child 6			**M / F**	**S/ T/ N**		**Y/ N/ DK**				**Y / N**

1. Diarrhea = 3 or more loose watery stools in 24 hour period *** If more children, fill out additional page**

3. ARI = Cough and difficulty breathing

Child (6-59 months) Nutrition Questionnaire-Darfur Nutrition Survey, September 2004
Clinical Exam

State: North / West / South *(circle)* **District:** _____ **Area:** Village / Camp / Town: *(circle)* _____ *(write out)*

Team No: 1 2 3 *(circle)* **Cluster:** _____ **Household No**: _____ **Date (dd/mm):** **_____/09**

Child	Bitot's Spots	Gums bleed spontaneously	Angular somatitis	HB	DBS
Child 1	**Y / N**	**Y / N**	**Y / N**		
Child 2	**Y / N**	**Y / N**	**Y / N**		
Child 3	**Y / N**	**Y / N**	**Y / N**		
Child 4	**Y / N**	**Y / N**	**Y / N**		
Child 5	**Y / N**	**Y / N**	**Y / N**		
Child 6	**Y / N**	**Y / N**	**Y / N**		

Child 1 Child 2 Child 3 Child 4 Child 5 Child 6

*** If more children, fill out additional page**

Annex IV: Verbal autopsy to determine cause of death: Darfur 2004

1)	Did _____ have (local term for measles)?	If YES ..... **STOP. Record code 1** If NO ..... Go to next question
2)	Did _____ have (local term for tetanus)?	If YES ..... **STOP. Record code 2** If NO ..... Go to next question
3)	Did _____ have liquid, watery, soft, OR frequent stools?	If YES ..... Go to next question If NO ..... Skip to question #6
4)	Did _____ have (local term for diarrhea)?	If YES ..... Go to next question If NO ..... Skip to question #6
5)	Did _____ have blood in the stool?	If YES ..... **STOP. Record code 4** If NO ..... **STOP. Record code 3**
6)	Did _____ have fever OR hot body?	If YES ..... Go to next question If NO ..... Skip to question #8
7)	Did _____ have stiff neck OR bulging fontanelle?	If YES ..... **STOP. Record code 5** If NO ..... Go to next question
8)	Did _____ have cough OR difficulty breathing?	If YES ..... Go to next question If NO ..... Skip to question #10
9)	Did _____ have fast breathing OR chest indrawing?	If YES ..... **STOP. Record code 6** If NO ..... Go to next question
10)	Did _____ have convulsions?	If YES ..... **STOP. Record code 7** If NO ..... Go to next question
11)	Did _____ die from an accidental injury? (car accident, fall)	If YES…… **STOP. Record code 8** If NO ..... Skip to next question
12)	Did _____ die from a violent (intentional) injury?	If YES ..... **STOP. Record code 9**

FOR CODES 8 OR 9 DESCRIBE ON CHART

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